

MOSES

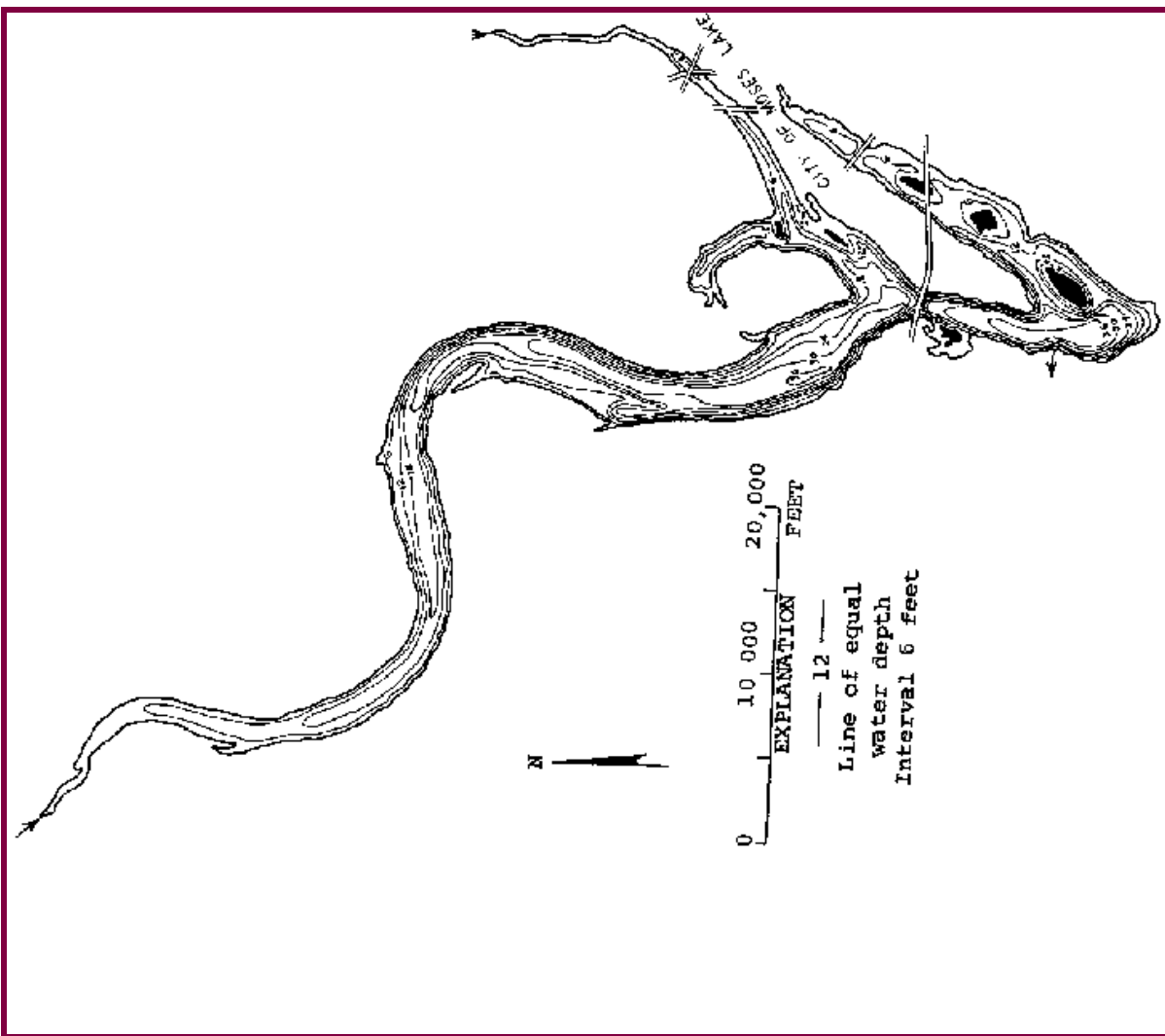
GRANT County

Lake ID: MOSGR1

Ecoregion: 7

Moses Lake provides a large aquatic recreational opportunity for the arid central part of Washington State. This large lake is located along I-90 just to the west of the City of Moses Lake.

<i>Area (acres)</i>	<i>Maximum Depth (ft)</i>	<i>Mean Depth (ft)</i>	<i>Drainage (sq mi)</i>	
6800	38	19	3080	
<i>Volume (ac-ft)</i>	<i>Shoreline (miles)</i>	<i>Altitude (ft abv msl)</i>	<i>Latitude</i>	<i>Longitude</i>
131000	62.31	1046	47 03 47.	119 19 08.



Station Information

MOSGR1

Primary Station	Station # 1	latitude: 47 06 40.5	longitude: 119 18 47.9
	Description:	Near the south end of Parker Horn; northeast of the state park and across from a boat launch on the east shore.	
Secondary Station	Station # 2	latitude: 47 05 15.8	longitude: 119 18 25.1
	Description:	Approximately mid-lake out from the WDFW launch on Pelican Horn.	
Secondary Station	Station # 3	latitude: 47 10 10.0	longitude: 119 19 58.9
	Description:	In main lake approximately 7500 feet southeast of Connelly Park (around the bend where the lake turns south, opposite inlet on west bank).	
Secondary Station	Station # 4	latitude: 47 07 22.1	longitude: 119 20 33.2
	Description:	Deep spot about 1.5 miles NW of state park launch. Out from white house with wood railed stairway on west shore.	
Secondary Station	Station # 5	latitude: 47 05 03.5	longitude: 119 19 36.3
	Description:	Just north of northern-most outlet. Slightly west of center channel.	

Trophic State Assessment for 1998

MOSES

Analyst: KIRK SMITH

TSI_Secchi:	58	N
TSI_Phos:	63	
TSI_Chlor:	64	
Narrative TSI: ^a	E	

Moses Lake has a long history of water quality problems and has been the subject of restoration efforts in the past. It remains in a eutrophic condition, though the water quality of the lake is improved as a result of earlier restoration efforts. There were no user perception surveys distributed for this lake so we cannot ascertain the public's desired uses or perception of the water quality in Moses Lake. This information is particularly important for this lake because Moses Lake is a large water body near a relatively densely populated city in central Washington. It is a valuable recreational and wildlife asset for the community; still, further management to improve water quality will likely be very expensive. The zooplankton community appears to be healthy and could support a good fishery. There were many blue-green algae colonies in the water column during all sampling events. Aphanizomenon and Microcystis were particularly abundant. Late summer anoxia in the hypolimnion is to be expected for this lake considering the high nutrient and chlorophyll concentrations. The lake may be nitrogen limited through most of the growing season. Although nutrient rich, the habitat survey did not reveal an overabundance of aquatic vegetation. This may be because of the reduced water clarity in the lake. Human influences (see habitat survey) may have an impact on waterfowl abundance. In particular, geese were observed congregating at parks and other grassy areas.

Our objectives for monitoring Moses Lake were to fulfill post-management monitoring requirements and to support work being conducted by others in 1998. Establishing a nutrient criterion for Moses Lake was not one of our objectives for this lake.

^a E=eutrophic, ME=mesoeutrophic, M=mesotrophic, OM=oligomesotrophic, O=oligotrophic

Chemistry Data										MOSES
Date	Time	Strata	Tot P (ug/L)	Tot N (mg/L)	TN:TP	Chloro- phyll (ug/L)	Fecal Col. Bacteria (#/100mL)	Hardness (mg/L)	Calcium (ug/L)	Turbidity (NTU)
Station 0										
6/17/1998		L					2			
		L					88			
		L					13			
7/15/1998		L					6			
		L					1 U			
		L					1 U			
8/12/1998		L					33 J			
		L					1000 G			
		L					1 U			
9/16/1998		L					1 U			
		L					1 U			
		L					1 U			
Station 1										
6/17/1998		E	98.4 J	.655	7	50		150		13 J
7/15/1998		E	111	1.15	10	45.9				7 J
		H	78.8	.759	10					
8/12/1998		E	38.5	.521	14	19.2				7.9
9/16/1998		E	69	.507	7	42.5				3.9
Station 2										
6/17/1998		E	45.1 J	.573	13	19.8				8.3 J
7/15/1998		E	48.1	.868	18	47.7				10 J
8/12/1998		E	48.5	.665	14	15				8
		H	42.7	.614	14					
9/16/1998		E	53	.491	9	27.8				3.8
Station 3										
6/17/1998		E	57.5 J	.644	11	31.6				10 J
7/15/1998		E	67.2	.858	13	42.5				10 J
		H	102	1.11	11					

8/12/1998	E	44.3	.65	15	13.3	10
	H	175	1.58	9		
9/16/1998	E	46	.598	13	13	3

Strata: L=lake surface, E=epilimnion, H=hypolimnion; Qualifier: J=Estimate, U=Less than

Watershed Survey

MOSES

Survey Date: 9/16/1998

Land Uses (1 = Primary, 2 = Secondary, etc.)

Agriculture(commercial, not hobby)

Residential

Commercial, Industrial

Park, forest or natural

Major transportation

Impervious surfaces (Roads and parking area): Mostly Curbed

Observations (check mark denotes presence)

BMP's ☐

Odors ☐

Cattle ☐ Ducks ☐ Geese ☐

Fertilizers and weed killers appear to be used in residential or agriculture area ☒

Agriculture areas.

Buffer zones around streams and wetlands ☐

Irrigation ☐

Survey Id: 10

Habitat Survey Summary Report

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Data are averages of 10 Stations Surveyed

Date of Visit: 7/19/1998

Vegetation Type (Avg. only of sites w/ vegetation present; 1=coniferous, 3=deciduous)

Canopy Layer Avg: 1.8 Number of stations with canopy: 10

Understory Avg: 2.9 Number of stations with understory: 10

Percent Areal Coverage (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

Canopy Layer: trees > 0.3 m DBH 1.4

	trees< 0.3 m DBH	0.7
Understory:	woody shrubs saplings	2.1
	tall herbs, forbs grasses	2.1
Ground Cover:	woody shrubs seedlings	1.6
	herbs, forbs, grasses	3.0
	standing water or inundated veg	1.6
	barren or buildings	1.0
Substrate Type (within shoreline plot):	bedrock	0.0
	boulders	0.0
	cobble/gravel	1.0
	loose sand	0.2
	other fine soil/sediment	0.2
	vegetated	3.6
	other	0.3
Bank Features:	angle (O:<30; 1: 30-75; 2:nr vertical)	1.2
	vertical dist (M from wtrln to high wt):	0.2
	horiz. dist. (M from wtrln to high wt):	0.0

Human Influence (0 = absent, 1 = adjacent to or behind plot, 2 = present within plot)

buildings	0.5
commercial	0.0
park facilities	0.1
docks/boats	0.5
walls, dikes, or revetments	0.2
litter, trash dump, or landfill	0.0
roads or railroad	0.1
row crops	0.0
pasture or hayfield	0.0
orchard	0.0
lawn	0.5
other	0.0

Physical Habitat Characteristics

station depth (at 10 m from shore)	1.6
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Bottom Substrate (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

bedrock	0.0
boulders	0.4
cobble	1.3
gravel	1.3
sand	1.9
silt	0.9
woody debris	0.2

Macrophyte Areal Coverage (0 = absent, 1 = <10%, 2 = 10-40%, 3 = 40-75%, 4 = >75%)

submergent	1.8
emergent	1.3
floating	0.0
total weed cover	2.2

Do macrophytes extend lakeward (-1 = yes, 0 = no) -0.5

Fish Cover (0 = absent, 1 = Present but sparse, 2 = moderate to heavy)

aquatic weeds	1.8
snags	0.0
brush or woody debris	0.4
inundated live trees	0.0
overhanging vegetation	1.0
rock ledges or sharp dropoffs	0.2
boulders	0.1
human structures	0.1

Zooplankton Report

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Date 8/12/1998 Station: 2 Lots of algal growth
Sample ID 13

Number of organisms measured: 54

Group	Percent	Group	Percent
Cladoceran	63.0%	Small < 1mm	53.7%
Copepod	37.0%	Large >= 1mm	46.3%
Other		Ratio of large to Small:	0.86
		Average size (mm):	0.90

Aquatic Plant Data

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Sampler: Parsons, O'Neal

Survey Date: 7/15/1998

Max depth of growth (M): 2.5

Comments sunny, calm. Blue-green algae bloom forming surface scum near shore in many areas. Lots of big carp, cormorants, greebes, geese, fish jumping. Bottom mostly rocky/sandy, not many submersed plants. Large sections of shoreline undeveloped. Conducted habitat survey for Kirk Smith.

SPECIES LIST

Scientific Name	Common Name	Dist ^a	Comments
<i>Carex sp.</i>	sedge	1	in undeveloped areas of shore
<i>Ceratophyllum demersum</i>	Coontail; hornwort	1	only saw 1 sprig in deeper water
<i>Iris pseudacorus</i>	yellow flag	2	in south end
<i>Juncus sp.</i>	rush	1	in undeveloped areas of shore

<i>Lythrum salicaria</i>	purple loosestrife	2	northern end
<i>Myriophyllum sp.</i>	water-milfoil	1	one fragment found at MontLake Park dock
<i>Phalaris arundinacia</i>	reed canarygrass	3	
<i>Phragmites communis</i>	common reed	2	more at north-most site
<i>Potamogeton crispus</i>	curly leaf pondweed	2	
<i>Potamogeton illinoensis</i>	Illinois pondweed	2	
<i>Potamogeton pectinatus</i>	sago pondweed	3	
<i>Potamogeton sp (thin leaved)</i>	thin leaved pondweed	2	in deeper water
<i>Scirpus sp.</i>	bulrush	3	bulrush, some dense patches in undeveloped areas
<i>Typha latifolia</i>	common cat-tail	2	seen at north end

^a 0 - value not recorded (plant may not be submersed)

2 - few plants, but with a wide patchy distribution

4 - plants in nearly monospecific patches, dominant

1 - few plants in only 1 or a few locations

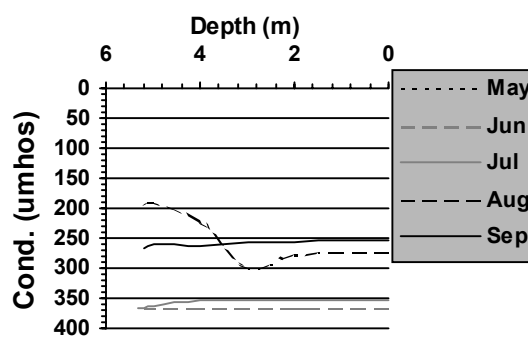
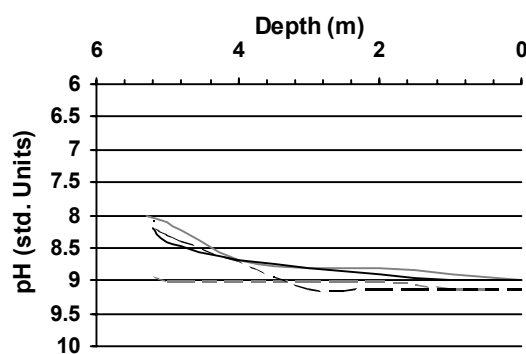
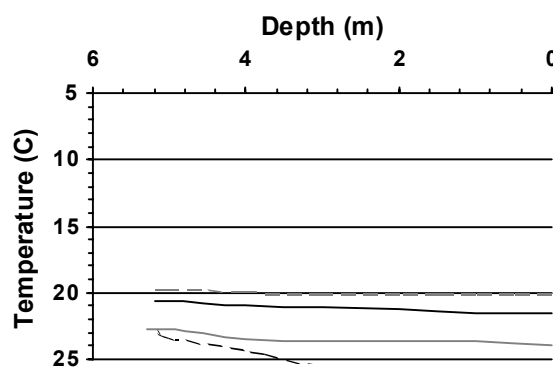
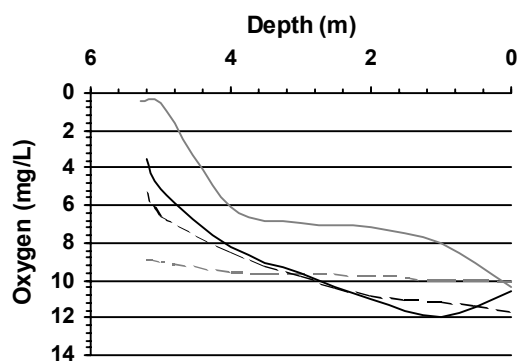
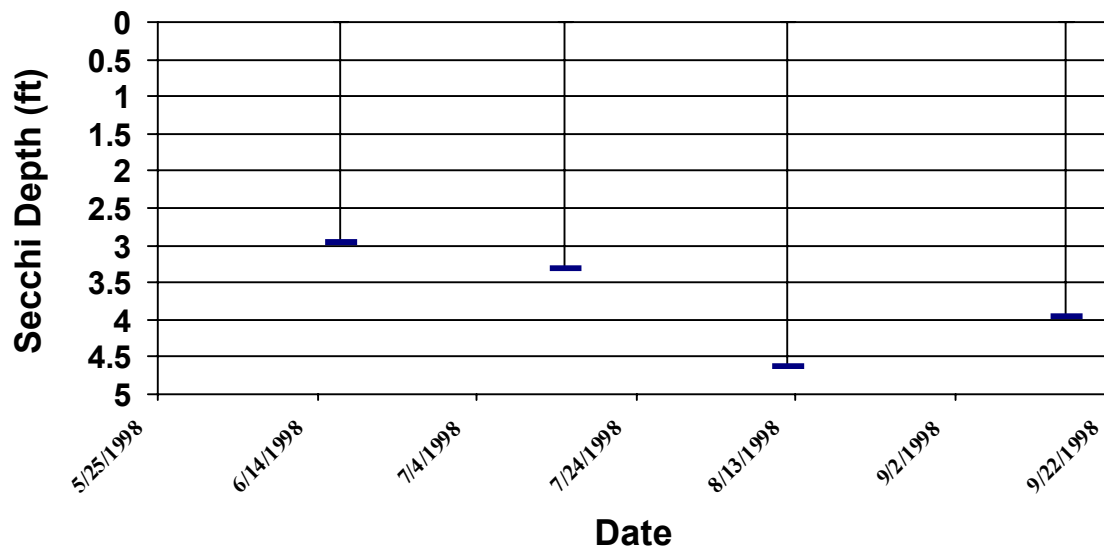
3 - plants in large patches, codominant with other plants

5 - thick growth covering substrate to exclusion of other species

Secchi Depth and Profile Graphics

Station: 1

MOSGR1



Secchi Data and Field Observations

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Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
Station 1													
6/17/1998			2.97	2	0	1		2	1	0	2	1	0
	Sampler: HALLOCK			Remarks: APHANIZOMENON BLOOM IN PROGRESS. TOOK SAMPLES. A FEW LARGE DAPHNIA IN ALL CASTS BUT NOT MANY. ST PARK IS ONLY UNDEVELOPED SHORELINE IN VIEW. RESORT HOTEL, CONDOS, LARGE HOMES. THERE ARE A DOZEN PARKS/WATER REC. AREAS AROUND LAKE.									
7/15/1998			3.3	3	70			1	1	37	7	4	0
	Sampler: HALLOCK			Remarks: LOTS OF NON-GAME FISH JUMPING. THICK APHANIZOMENON BLOOM, W/CLUMPS OF OTHER ALGAE. LARGE DAPHNIA IN ALL CASTS BUT NOT ABUNDANT. LESS APHANIZOMENON. AT 4.5M BUT STILL PRESENT. FINE GREASY CONSOLIDATED SEDIMENT ON ANCHOR.									
8/12/1998			4.62	6	0			1	1	0	15	1	1
	Sampler: HALLOCK			Remarks: NO APHANIZOMENON NOW. BLOOM IS MOSTLY SMALL SPECS W/SOME CLUMPS AND SHORT THIN TRICHOMES. TOOK SAMPLE									
9/16/1998			3.96	6	10			1	1	0	25	4	0
	Sampler: HALLOCK			Remarks: ALGAE BLOOM THICK THROUGHOUT BUT ESPECIALLY CLUMPING AND SCUMMY DOWNWIND. TOOK SAMPLE. ALSO TOOK ZOOPLANTON SAMPLE AT STATE PARK ACCESS									
Station 2													
6/17/1998			3.96	2	0	2		2	1	0	1	2	0
	Sampler: HALLOCK			Remarks: APHANIZONMENON BLOOM NOT AS SEVERE AS SITE 1. NO CLUMPS. SOME LARGE DAPHNIA IN ALL CASTS. HEAVY MUD ON ANCHOR WHICH WAS SO FILLED WITH SMALL SNAIL SHELLS AS TO FEEL LIKE SAND.									
7/15/1998			3.63	2	30			1	1	0	2	2	0
	Sampler: HALLOCK			Remarks: LITTLE APHANIZOMENON BUT LOTS OF SMALL BLUE-GREEN CLUMPS. NOT AS MANY LARGE DAPHNIA AS SITE ONE BUT SOME SMALLER COPEPODS.									
8/12/1998			3.3	6	0			1	1	0	6	1	0
	Sampler: HALLOCK			Remarks: SIMILAR ALGAE ASSEMBLEDGE AS SITE #1 PERHAPS FEWER LARGER CLUMPS									
9/16/1998			4.95	6	20			1	1	30	0	4	0
	Sampler: HALLOCK			Remarks: ALGAE BLOOM EVIDENT HERE TOO BUT NOT AS BAD AS AT STATION 1									

Station 3

Date	Time	Temp- erature (F)	Secchi (ft)	Color (1-greens, 11-browns)	Bright- ness (pct)	Wind (1-none, 5-gusty)	Rainfall (0-none, 5-heavy)	Aesthetics (1-bad, 5- good)	Swimming (1-poor, 5- good)	Geese (#)	Waterfowl (besides geese #)	Boats- Fishing (#)	Boats- Skiing (#)
6/17/1998			2.64	2	10	2		2	1	0	0	2	0
	Sampler: HALLOCK			Remarks: APHANIZOMENON BLOOM SIMILAR TO SITE#2. FISHERMEN REPORT WALLEYE AND PERCH. LOTS OF DEAD CARP. THIS BASIN SPARSELY DEVELOPED.									
7/15/1998			4.29	2	50			1	1	0	3	1	0
	Sampler: HALLOCK			Remarks: SURFACE ALGAE SMALLER COLONIES; APHANIZOMENON SPARSE BUT LOTS OF APHAN AT 2 AND 3M (MOVE DOWN DURING DAY?) 6M NO NOTICEABLE ALGAE. LOTS OF DAPHNIA AND COPEPODS. CONNOLLY PARK LAUNCH BAY IS FULL W/THICK BLUE-GREEN FORMING MATS.									
8/12/1998			3.63	2	0	1		2	2	0	0	2	0
	Sampler: HALLOCK			Remarks: 5 & 6 M SAMPLES HAVE STRONG H2S SMELL. MUCH LESS CLUMPING THAT STATION #1.									
9/16/1998			7.26	6	35	1		1	1	0	33	0	0
	Sampler: HALLOCK			Remarks: ALGAE BLOOM HERE TOO BUT LESS SEVERE THAN AT SITE #1. SAMPLED FOR VELIGERS OFF CONNELLY PARK									